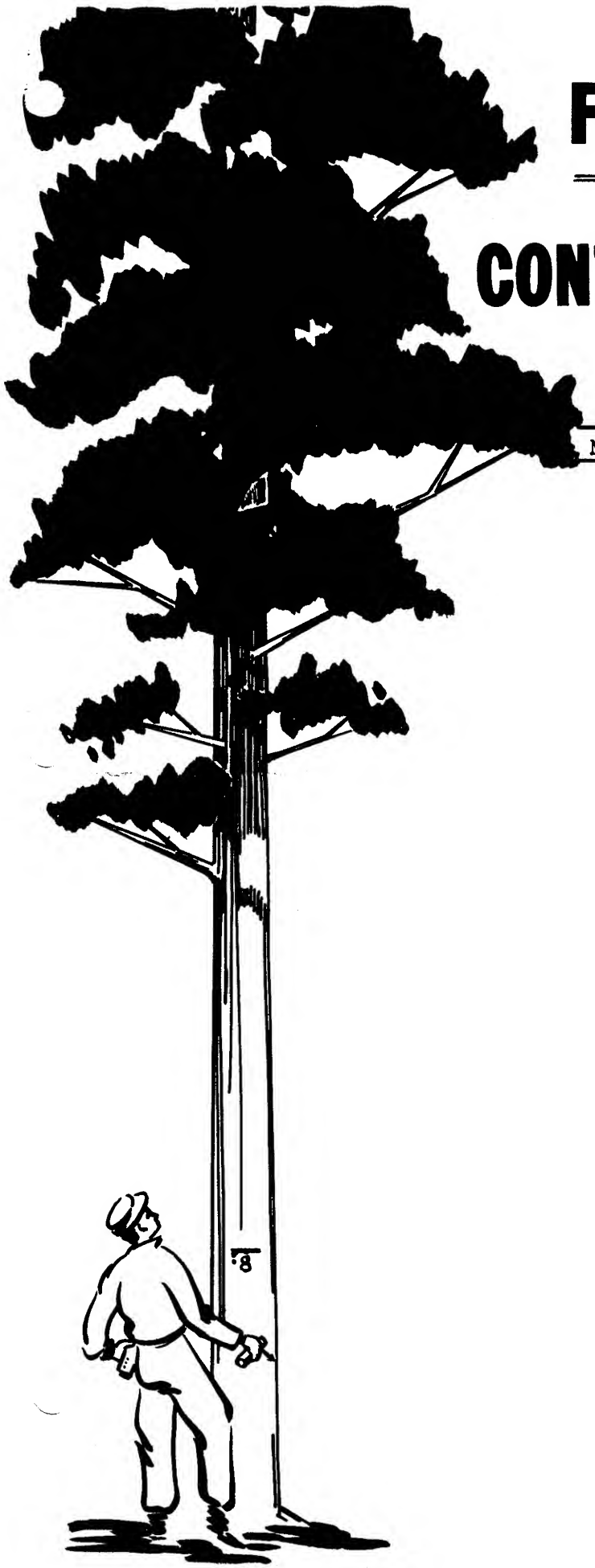


FOREST CONTROL by CONTINUOUS INVENTORY

"Today I have grown taller from walking with the trees."

...Karle Wilson

Milwaukee, Wis. February, 1964 No. 119

One must learn by doing the thing;
for though you think you know it
You have no certainty, until you try.

Sophocles
496-406 B.C.

The Forester

CRUISE ALONE AND LIKE IT

CFI WITH A ONE-MAN CREW IS A WORTHWHILE ECONOMY

No cruising crew is more proficient and productive with permanent plot samples than a one-man crew. Working alone is especially economical for Port-A-Punch remeasurements where previous records are punched into columns adjacent to the new measurement fields. *

The woods safety factor is the only obstacle to one-man cruising. Danger to life and limb can be reduced, but not eliminated, by two-way car radio communication, and by the advance preparation of daily travel rosters for each man. In extremely rugged terrain and inaccessible wilderness country, or in areas of heavy snake concentration, one-man inventory is not recommended.

It is a pleasure to work alone in the woods, but it is also a great responsibility. There is no one to blame but yourself for omitted or erroneous records. Since mistakes are not shared with anyone, check cruising is also simplified.

Cruising without a partner must be learned. The solo inventory specialist will need time to adjust to this new working arrangement. He must not be discouraged with his apparent awkwardness during the first few days of work, and a mind open to essential changes in technique is an absolute essential. If these adjustments and many others are made, one-man cruising will be found both economic and practicable. Time elements resulting from an administrative research study support these contentions.

BROAD TIME RECORDS ON 75 CFI PLOTS REMEASURED BY A ONE-MAN CREW

The Stone's Woods plots, this nineteenth remeasurement, comprise 1,680 tree card records. All of these plots were measured during the fall of 1963 in 13 ten-hour days by one man. The work was done at the rate of 5.8 fifth-acre plots per day or 4.59 minutes per tree card handled. The broad breakdown of time follows in table form, and the factors influencing the study will appear in next month's Newsletter.

THE TIME IT TAKES

ITEM	HOURS PER DAY	% OF TOTAL HOURS
Car Travel to Woods Gate	1.52	15.4
Plot Travel Between Plots	1.31	13.2
Time Within Plots Only	7.05	71.4
Totals	9.88	100.0

MINUTES PER TREE	4.59

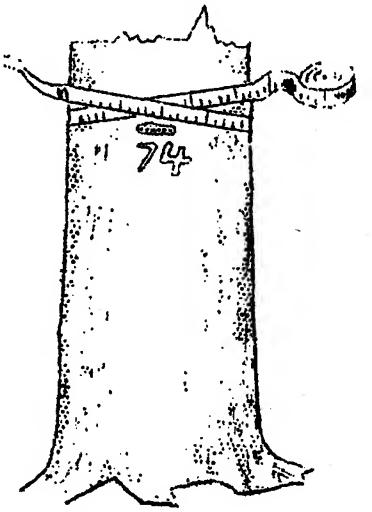
To be continued in the March issue

* See Newsletter No. 113, "A Better Way to Use Port-A-Punch Cards"

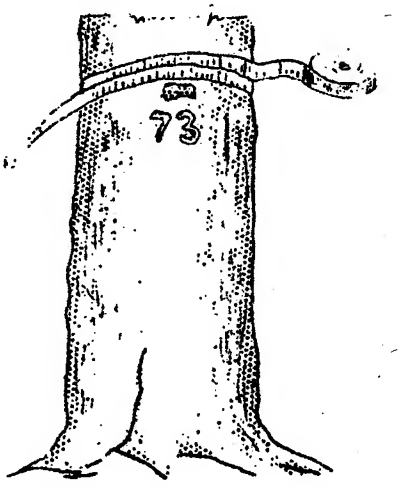
Tens of thousands of trees I have remeasured, bored and stump counted in Region 9, and I know that stationary or regressive diameters do not occur en masse but only in rare and uncommon cases. When this situation is found in 10%, 20% or 30% of the trees over a 5-year growth period, inaccuracies are involved.

For trees of any species measured and remeasured in dormant periods on productive sites, at temperatures above freezing, diameter regressions are rare. I say this regardless of extreme cellular turgidity due to excessive moisture at the first measurement and regardless of maximum cellular contraction due to extreme drought at any subsequent measurement. Five years of growth in tree diameter, however small the amount, is measurable if the diameter tape is used right, and if the right diameter tape is used.

NARROW, SNAP BACK TAPES ARE INADEQUATE



Narrow, snap back diameter tapes 1/4" in width are difficult to use. They are quite delicate and easily broken at the zero end. They cannot be placed about the trunk of a tree with consistent accuracy to measure diameters for growth records. It is much more difficult, for example, to get the upper and lower tape segments to coincide at the point of reading. The tapes are all too likely to cross over each other as shown in the somewhat exaggerated sketch. When this happens the reading is distorted. Since the figures and graduations are small, the tendency to pull the tape up in front for easier reading is increased. The small tape tends to zigzag about the trunks of large, rough-barked trees. Sometimes it slips down deep into crevices. Its placement at best is seldom as true and firm as the wider tape.

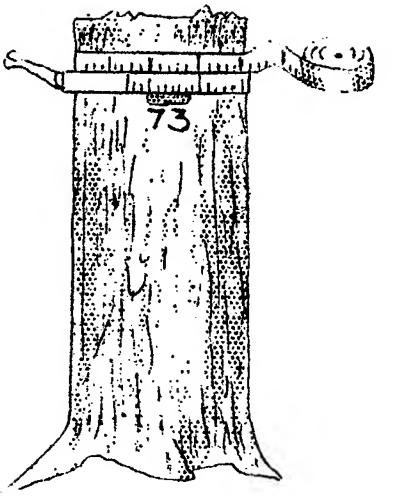


The net result of these errors is often a plus diameter reading, which may cause erroneous high or low growth records. We cannot count on successive diameter readings to compensate for personal errors which differ from tree to tree and from cruiser to cruiser.

When checks on cruisers are made by capable tape technicians, and excessive diameters are found, we may be sure that tape placement was at fault. This problem is especially serious with narrow, snap back diameter tapes.

THE STANDARD, WIDE DIAMETER TAPE WORKS FINE

Standard diameter tapes, 3/8" in width, although subject also to misuse, are not nearly so troublesome as the 1/4" tapes. Graduations and figures are larger and easier to read. There is less evidence of poor tape placement on large, rough barked trees, and the tape seldom settles into deep crevices. There is somewhat less tendency to pull the tape up in front of the tree for easy reading, and upper and lower tapes may be made to coincide readily as shown in the sketch.



Very often the cruiser can tell by the feel of the tape in his hands and the lay of it on the trunk that it is in proper position for accurate reading. This sense is most difficult to acquire with the delicate, narrow tape which cuts more deeply into soft barked trees, and falls more readily into horizontal cracks in the bark.

Time differences in the use of the two tapes is not important. Returning the reel tape to its box becomes a sub-conscious action carried out while the lower trunk is being examined for soundness or grade.

THE IBM PORT-A-PUNCH STYLUS

The PAP stylus point has been breaking off in field use. The flanged end of the stylus is the weak point. If a small file or whetstone is carried in the field pack, repairs may be made easily by blunting the broken edge. The blunted point works almost as well as the flanged point in the removal of the small bits of prepunched card, whereas the broken end of the stylus is too sharp to do an effective job.

CAL STOTT
Forester, Region 9
U. S. Forest Service

FACTORS INFLUENCING THE TIME STUDY FOR SOLO CFI IN STONE'S WOODS

1. CAR TRAVEL TO WOODS GATE

The round trip by car to Stone's Woods gate was 58 miles. County roads limited the speed to an average of 38 miles per hour. Each evening the trip home was made after dark. Weather conditions favorable for car travel prevailed throughout the project.

The total car travel time to and from the woods gate was 704 miles. One overnight stay was made in the woods.

2. FOOT TRAVEL BETWEEN PLOTS

The distance walked outside of the plots each day approximated one-half mile. It included travel to and from the car and between plots and plot lines. Plot centers were set at two-chain intervals. There was no lost time hunting for center stakes and walking conditions were good, with very little brush and windfall to interfere.

Although not exactly measurable, the estimated foot travel in 13 working days was 7 miles.

3. FOOT TRAVEL WITHIN PLOTS ONLY

It is estimated that the daily walking distance within plots was one and one-half miles. It is believed that this is a fairly accurate figure since the number of trees per plot is known and the plot radius is constant. Travel from tree to tree was progressive, interrupted only by the measurement of distances to hypsometering points for tall trees.

There were 20 miles of in-plot travel on foot. This walking and the related work required 71% of the one-man crew's time. The work included all of the duties and tree diagnoses necessary for C.F.I. within 75 plots. *

4. QUALITY OF WORKMANSHIP

No unusual pressures of any kind were allowed to influence the refinement and quality of the work done. Although the working day was somewhat longer than normal, there was no undue haste and measurements and judgments were thoroughly made. Steady and careful working habits governed the project from start to finish. In spite of the care taken, there will be errors found for it seems impossible to eliminate them completely in any human undertaking.

5. DESCRIPTION OF AREA STUDIED

The project area was the 48 acre Stone's Woods near North Lake, Wisconsin, about 30 miles northwest of Milwaukee. The tract is well stocked with oak-mixed hardwoods on rolling to moderately hilly glacial moraine soil. The stand is predominantly sawlog timber 100 to 120 years old. Red oak is the chief species.

6. TIMBER PRODUCTS AND VOLUMES

Selective cutting, mortality and growth are constantly changing the volumes in this forest, and no recent calculation of the average stand has been made. The plots have sawtimber volumes which range from 3,000 to 12,000 board feet net Scribner per acre. The approximate average net volume is 6,000 board feet per acre. There is in addition a cordwood volume of from 5 to 6 cords per acre in non-sawlog trees.

7. NUMBER OF TREES IN PLOTS

The tree cards total 1,680 for these 75 sample plots. This year there are 695 sawlog trees over 11" in diameter, and 689 cordwood trees 7" and larger. Tree cards for cut and dead trees accumulating over 18 years number 296. There are 18.4 living trees in the average plot and 4 additional cut or dead trees. The largest tree is 32" in dbh.

8. PLOT ARRANGEMENT

The circular, fifth-acre samples are spaced 2 chains apart on 11 east and west plot lines through the area. The plot lines vary from 2 to 4 chains apart. Distances between plots and strips were originally paced and are somewhat irregular but completely unbiased.

Each plot has a steel center stake driven to ground level and witnessed by numerous painted trees and shrubs. All trees have been numbered from the beginning and the plots are perfectly visible.

9. TIME OF YEAR AND WEATHER CONDITIONS DURING MEASUREMENTS

The Stone's Woods plots were measured when time was available between October 14 and November 15, 1963. Temperatures ranged from 84° Fahrenheit in October to a low of 21° Fahrenheit in November. Moderate showers fell during two of the 13 days, delaying work slightly. The records were made following a period of May and early June drought. Occurring at the peak of the normal growing season, this lack of rain caused a noticeable decline in DBH growth, particularly for trees which were below average vigor. The annual rainfall was 19.10".

Leaf fall began late in October and continued on an increasing scale through November. During the last half of the mensuration work the condition of the upper bole and its length could be determined with far greater ease than at the beginning of the period.

* Refer to February, 1963 Newsletter No. 107 for coding scheme.

** Refer to August, 1963 Newsletter No. 113 for Improved Template for Port-A-Punch boards.

EQUIPMENT USED TO REMEASURE STONE'S WOODS PLOTS WITH A ONE-MAN CREW

1. STANDARD 20-FOOT DIAMETER TAPE

Measurements made to hundredths of inches and compared with previous record. Hook end of tape covered with black plastic tape.

2. PORT-A-PUNCH BOARD AND TEMPLATE **

All records punched as taken on individual PAP cards. Unnecessary template holes were pasted over. Extra stylii available at all times.

3. FIFTH-ACRE PLOT TAPE FOR PLOT RADII

Tape with 8" pin fastened to zero end. Stuck in plot center and used chiefly for checking in-growth trees. The tape was coated with yellow spray enamel and marked at the pin end with blue plastic ribbon to improve visibility. Tape end notched to show that no breakage had occurred.

4. FIFTH-ACRE PLOT TAPE FOR MEASURING TO HYPSOMETERING POINTS

This is a similar tape but marked at the 50-foot point. The pin was stuck into the ground at the base of the tree and straightened out beneath the arm when advancing toward the 50-foot point at which the usable length was taken. Sometimes two hypsometering points were needed at right angles to the tree. This tape was carried from tree to tree most of the time so as to be available when needed. Tape end notched.

5. UNJOINTED BAMBOO POLE 12 FEET LONG, WITH ADJUSTABLE 9" TO 14" CALIPER

Used to measure the top DOB of the butt log in sawlog trees. Two measurements made at right angles. Pole graduated in 2-foot intervals to facilitate the measurement of clear cuttings between defects in factory log grading. Carried or tossed from tree to tree.

6. BAMBOO POLE 24 FEET LONG WITH FIXED 4-1/2" CALIPER

Used to directly measure cordwood and cull trees under 35 to 40 feet in usable length. Caliper hung over limb or stub at 30 feet to aid in judging or measuring usable lengths above 30 feet for either cordwood or sawlog trees. Poles graduated in two-foot intervals to assist in measuring lengths to a full two-foot interval of bole. Pole carried from tree to tree. Extra 9" caliper carried in pack for use on sawlog trees but fastened to the 30-foot pole on occasion, to determine 9" DOB points on straight, clean boles.

7. HAGA HYPSOMETER FOR USABLE LENGTHS

Used for measuring trees with usable lengths greater than 35 to 40 feet. Haga used in all cases at a distance of 50 feet from the tree.

8. SOUNDING AXE -- 3/4 POUND SIZE

Carried to test the soundness of tree butts with evidence of rot or hollowness.

9. TIMBER CRUISER'S APRON

An absolute essential in solo CFI. It holds the Port-A-Punch board, stylus, pencils, codes, standards, tube paint, Brady correction seals, tape menders, and sometimes a Stanley snap back tape graduated in feet and inches.

10. PACK SACK

Most important purpose to carry lunch and thermos, but used also for extra equipment and spare parts, blank and completed PAP cards, manuals, rain gear, polyethylene sheet and a warm jacket.

SUMMARY OF RECORDS MADE AND PORT-A-PUNCHED IN THE COURSE OF THE NINETEENTH MEASUREMENT *

1.	Plot number	These three items were prepunched and not repunched unless in error.
2.	Tree number	Few errors. One tree card missing.
3.	Species	
4.	1963 DBH	Measured and punched to hundredths.
5.	1963 tree quality on sawlog trees	Checked on sawlog trees. Top DOB calipered.
6.	1963 sawlog length on sawlog trees	Measured with 24-foot pole and gauge or Haga.
7.	1963 cordwood length on all trees	Measured with 24-foot pole and gauge or Haga.
8.	1963 sawlog soundness on sawlog trees	Checked and punched.
9.	1963 cordwood soundness on all trees	Checked and punched.
10.	1963 butt log length - sawlogs	Prepunched. Checked and changed if necessary.
11.	1963 butt off length - sawlog trees	Punched in X position where 2 feet and over.
12.	1963 tree vigor	Flash checked. Not weighted. Few changes.
13.	1963 tree status	Checked and punched.
14.	1963 management potential	Checked and punched.
15.	1963 stump age of cut trees	Ring counts made for 6 cut trees.
16.	1963 mortality kind	Punched for 11 dead and cut trees.
17.	1963 mortality year	Punched for 11 dead and cut trees.
18.	Errors (E)	X-punched whenever found and corrected for previous record.
19.	Fuelwood (F)	X-punched for trees cut and used for fuel.
20.	Disease (D)	X-punched for oak wilt and Dutch elm disease.
21.	1963 ingrowth	Complete new cards punched for trees becoming 6.96" DBH and larger. These trees and occasionally others were tube paint numbered. Zeros punched in previous record fields. No missed trees found.
22.	Special note	All errors in previous record fields were pasted over with red correction seals and punched correctly. All trees with fixed usable lengths were X-punched in standard column positions. No need to measure length again.
23.	Comment	These remeasurements covered the same jobs which are also a standard part of plot establishment. All records compared for check. The only additional duties necessary at establishment are punching species, tree and plot number, setting and witnessing center stakes, completing plot master cards, and paint numbering trees.

With Newsletters No. 119, February, 1964
and No. 120, March, 1964

CAL STOTT
Forester, Region 9
U. S. Forest Service - Jan. 1964

USDA SCS MILWAUKEE WIS 1964

JANUARY THROUGH JUNE SCHEDULE FOR CFI

JANUARY

13-17 Menominee Enterprises, Inc., Wis. Systems block diagram for 1401, for 920 plots; 34,000 trees; 230,000 acres. Milwaukee.

20-24 Mosinee Paper Mills Company, Wis. Assist with 1401 programming, for 559 plots; 16,000 trees; 80,000 acres. In Minnesota.

27-31 Pioneer Forest, Missouri. Error sort checks and hand corrections. A 604 job on 421 plots; 7,500 trees, and 135,000 acres. In Milwaukee.

FEBRUARY

10-14 U.S.B.I.A. project, Minn. & Wis. Systems block diagram for 1401 for 1,200 remeasured plots; 30,000 trees; 434,000 acres. At Purdue.

17-20 Pioneer Forest, Missouri. Error correction continued. Complete species tabs. In Milwaukee. Mosinee programming continuing.

21 Menominee Enterprises, Inc. Review 1401 programming. In Madison, Wis.

24-28 Indiana State projects. Systems block diagram for 1401. Plans for establishment of 1,200 plots; 30,000 trees; 120,000 acres. In Milwaukee.

MARCH

9-13 Ontario and Minnesota Paper Company, Canada. Review case. Systems block diagram for remeasurement of 600 plots; 12,000 trees, 400,000 acres. In Milwaukee.

19-20 Purdue project. Conference on thesis material from local woodlot plots. In Milwaukee.

23-31 Ford Forestry Foundation, Michigan. Data processing of completed remeasurements; 230 plots; 7,000 trees; 1,700 acres. Lectures on CFI fundamentals with 23 members of the school for forestry aides.

APRIL

Northwestern Pulp and Paper Company, Ltd., Canada. Systems block diagrams for 1401, for remeasurement of established plots. Milwaukee.

Purdue field training in CFI. A part of the regular CFI course. In Lafayette, Indiana. Journal of Forestry article on Forest Control by Continuous Inventory in Region Nine. Cooperative work on Purdue students' Doctors thesis using local woods plot.

MAY

Indiana State cruiser training on Stone's Woods. North Lake, Wis. Journal of Forestry article. CFI Newsletters. Prepare program for summer student employee.

JUNE

1-4 Preparation of material and CFI school at Univ. of Mass., June 1-12.

15-26 Preparation for field season. Smith and Stott